

U.S. Department of
Homeland Security

United States
Coast Guard



Coast Guard Navigation Standards

COMDTINST M3530.2B



COMDTINST M3530.2B

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COMMANDANT INSTRUCTION M3530.2B

Subj: COAST GUARD NAVIGATION STANDARDS MANUAL

- Ref:
- (a) U.S. Coast Guard Regulations, COMDTINST M5000.3 (series)
 - (b) Cutter Training and Qualification Manual, COMDTINST M3502.4 (series)
 - (c) U.S. Coast Guard Boat Operations and Training (BOAT) Manual, Volume I, COMDTINST M16114.32 (series)
 - (d) U.S. Coast Guard Boat Operations and Training (BOAT) Manual, Volume II, COMDTINST M16114.33 (series)
 - (e) Operational Risk Management, COMDTINST 3500.3 (series)
 - (f) U.S. Navy Ship Control and Navigation Personnel Qualification Standard (PQS), NAVEDTRA 43492-2 (series)
 - (g) Cutter Organization Manual, COMDTINST M5400.16 (series)
 - (h) Personnel Qualification Standard (PQS) Officer Of the Deck (OOD) COMDTINST M3502.5 (series)
 - (i) Information and Life Cycle Management Manual COMDTINST M5212.12 (series)
 - (j) Procedures for the Preparation and Disposition of Cutter Logs, COMDTINST M3123.12 (series)
 - (k) U.S. Navy CIC Common Core Watch PQS, NAVEDTRA 43311-4 (series)
 - (l) Nautical Chart Symbols, Abbreviations and Terms, Chart No. 1

1. **PURPOSE.** This Manual promulgates navigation policies and procedures for all cutters and shore based boats.
2. **ACTION.** Area and district commanders, commanders of maintenance and logistics commands, and unit commanding officers and officers-in-charge (CO/OIC) shall ensure the requirements of this Manual are included as appropriate in the area and district training team curricula, Tailored Ships Training Availability (TSTA), Special and

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Emergency Operations and Procedures (SEOPS), Standardization Team (STANTEAM) and other training and inspection programs. Internet release is not authorized.

3. DIRECTIVES AFFECTED. Coast Guard Navigation Standards, COMDTINST 3530.2A is hereby canceled.
4. DISCUSSION.
 - a. This Manual is designed to assist the CO/OIC, Navigator and Coxswain in carrying out their responsibilities as outlined in reference (a).
 - b. This Manual merges elements that are common to both the cutter and boat communities, while treating remaining differences independently, as appropriate and is not intended to be all inclusive on vessel navigation. Development and implementation of sound command navigation standards and proper risk management is imperative.
5. CHANGES. Change recommendations should be routed via the chain of command to Commandant (G-OCU) for cutters and (G-OCS) for shored based boats.
6. ENVIRONMENTAL ASPECT AND IMPACT CONSIDERATIONS. Environmental considerations were examined in the development of this Manual and have been determined to be not applicable.
7. FORMS. See Enclosure (7).



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Assistant Commandant for Operations

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CHANGE RECOMMENDATION

PUBLICATION: _____

DATE: _____

TYPE OF CHANGE: ADD: _____

DELETE: _____

MODIFY: _____

EXACT CHANGES RECOMMENDED:

RATIONALE:

SUBMITTED BY: _____
(ORIGINATING COMMAND)

POINT OF CONTACT: _____

PHONE NUMBER: _____

HQ ACTION: _____
(HQ DIV)

ACCEPTED: _____

MODIFIED: _____

REJECTED: _____

REMARKS:

SEND CHANGE RECOMMENDATIONS TO COMMANDANT (G-OCU or G-OCS)

RECORD OF CHANGES

[illegible]

INTRODUCTION

- A. Purpose. This Manual merges elements that are common to both the cutter and boat communities, while treating remaining differences independently, as appropriate. Traditional terms such as “fix” and “estimated position”, which carried different meanings between the two communities, are reconciled. New terms associated with electronic navigation are defined for clarification. Clear guidance is provided on the use of systems and the provision, selection and maintenance of electronic chart data.
- B. Discussion.
1. The combination of electronic position-fixing systems and electronic navigation systems significantly changed the way the Coast Guard navigates both cutters and boats. The previous edition of this Manual was published in May 2002, and for the first time formally addressed both electronic navigation systems and boat navigation. This revised Manual provides detailed guidance for the use of electronic navigation and charting systems in the Coast Guard.
 2. With the increased usage of electronic navigation and charting systems, new words, definitions and acronyms have been introduced into the standard navigation language. In order to ensure all Coast Guard personnel understand these new terms, this Manual includes both Appendixes A (Glossary) and B (Acronyms). If a word or acronym is not clearly identified in the Manual, refer back to Appendixes A and/or B for clarification.

CHAPTER 1. COMMANDING OFFICER/OFFICER IN CHARGE

A. Responsibilities. Commanding Officers/Officers in Charge (CO/OICs) shall:

1. Ensure compliance with the provisions of this Manual.
2. Promulgate Command Navigation Standards.
3. Assign, train and qualify navigation personnel in accordance with references (a), through (d) as appropriate.
4. Incorporate the principles of effective mission analysis and risk assessment into navigational planning in accordance with reference (e). The mission analysis process may be tailored to be consistent with the complexity of the specific mission, but should not omit any step in the process.
5. Conduct navigation exercises in accordance with reference (b) and/or (d).
6. CO/OICs of cutters shall designate a Navigator in accordance with reference (a). However, due to the size, billet structure, and missions of some cutters, it may not be possible to comply with the assignment criteria of reference (a). In those cases, the assignment as Navigator shall be based on the proficiency, training, maturity and judgment of the individual being considered for the position. Navigators shall be a qualified underway Officer of the Deck on the cutter presently assigned and shall complete applicable sections of reference (f). Schools listed in reference (f) are recommended but not required.

B. Command Navigation Standards. CO/OICs shall publish Command Navigation Standards that incorporate the navigation requirements detailed in reference (a) and this Manual. Command Navigation Standards shall, at a minimum, include:

1. All Units.
 - a. Navigational draft.
 - b. Definition of shoal water and method to identify shoal water.
 - c. Command definitions of Navigational Zones. (i.e. areas that require specific levels of attention to and frequency of navigational tasks.) Navigational zones shall be based on the vessels navigational draft, mission, operating environment, etc. Navigational Zones shall include:
 - (1) Restricted Waters (i.e. Harbor, Harbor Approach, Near Coastal).
 - (2) Coastal.
 - (3) Open Ocean.

(4) Any additional zones required by specific operating environments or operational circumstances.

- d. Standard navigation fix intervals for each navigational zone.
- e. Standard navigation plotting symbols. Enclosure (1) may be used for this purpose either in its entirety, or tailored at command discretion.
- f. Standard line handling commands. Enclosure (2) may be used for this purpose either in its entirety, or tailored at command discretion.

2. Additional Cutter Items.

- a. Specific guidance concerning navigation of the cutter's boat(s) while operating independently of the cutter.
- b. Specific navigation team manning requirements for navigating with electronic navigation systems and/or paper charts for each navigational zone. Standard Navigation Team positions are listed in Enclosure (3).
- c. Standard helm and engine order commands (see Enclosure (4)).
- d. Special Sea Detail, Anchoring and Mooring Bills in accordance with reference (g) and relevant sections of this Manual.
- e. A list of paper charts required to be ready for immediate use and up-to-date thru the latest Local Notice to Mariners if required by Enclosure (5).
- f. Navigation reports as required for specific operating conditions while using paper charts and electronic navigation systems. These reports may include:
 - (1) Fix time.
 - (2) Fix type (and quality, as appropriate).
 - (3) Fix position in relation to proposed track.
 - (4) Report CIC/CSC concurs, does not concur, or has no fix.
 - (5) Any recommendation to regain/maintain proposed track.
 - (6) Nearest hazard to navigation.
 - (7) Next aid to navigation.
 - (8) Distance to next turn.
 - (9) Time to next turn and turn bearing/turn range.

- (10) Course after next turn.
- (11) Set and drift (as required).
- (12) Depth of water beneath the keel and comparison to charted depth.
- (13) Other pertinent information.

3. Additional Boat Forces Unit Items.

- a. A list of paper charts, including the unit's Area of Responsibility (AOR), that must be ready and up-to-date thru the latest Local Notice to Mariners.
- b. Key operating areas.
- c. Principle navigation routes, tracklines, standard waypoints, and turn bearings.
- d. Areas within the unit's AOR where boat crews shall conduct frequent area familiarization transits in accordance with reference (e).
- e. Areas within the unit's AOR that pose significant navigational or environmental risks to boats.
- f. Specific operating guidance such as speed limits, safe operating distances from known hazards, frequency of fixes, and restricting operating areas for specific boat types. An example of unit level guidance is provided in Enclosure (6).
- g. Units conducting surf operations shall establish navigation and piloting requirements for use during surf operations (i.e. use of natural ranges, radar ranges, waypoints, etc.).
- h. Each unit shall maintain a chart on display in the operations/planning space that highlights known hazardous and special operating areas within the unit's AOR.
- i. Each unit shall define requirements for maintaining Dead-Reckoning plots based on boat type, navigational systems, and operating environments.

CHAPTER 2. GENERAL NAVIGATION REQUIREMENTS

A. Purpose. This section sets forth minimum navigational requirements for all Coast Guard cutters and boats (NOTE: WLI, WLIC and WYTL class cutters, while operating on rivers and Intercoastal Waterways (ICW), and the WLR class cutters are exempt from the specific requirements of this section. OICs of these units shall tailor the requirements of this chapter, as appropriate, for incorporation into their Command Navigation Standards).

B. General Navigation Requirements.

1. Positioning Sources. Figure 2-1 is the hierarchy of various positioning sources.

- a. Category I positioning sources are adequate for use as the primary source of own vessel's position while operating in all waters.
- b. Category II positioning sources are not considered adequate for precise navigation and shall only be used as the primary source of own vessel's position in open ocean.
- c. The only Global Positioning System (GPS) corrections currently authorized for Coast Guard navigational use are provided by the Maritime Differential GPS system.
- d. If a unit is equipped with a GPS receiver that is capable of receiving GPS corrections from the Wide Area Augmentation System (WAAS), that receiver shall only be operated with WAAS disabled. WAAS is a satellite-based GPS augmentation system being implemented by the Federal Aviation Administration (FAA) to support lateral and vertical navigation for all phases of flight in the US and is not authorized for Coast Guard navigational use.
- e. When using any form of GPS as the primary source for positioning information every third fix shall be compared to an unrelated positioning source. When navigating in Open Ocean, in areas where LORAN-C coverage is not available, comparing GPS to a celestial observation once a day will meet this requirement.

POSITIONING SOURCE HIERARCHY

CATEGORY I
GPS with DGPS corrections
GPS PPS (Precise Positioning Service)-Classified System
GPS SPS (Standard Positioning Service) (see Note 1)
Visual and/or Radar (includes Radar/Chart Matching)
CATEGORY II
LORAN-C
Inertial Navigation System
Celestial

Figure 2-1

Note 1 – Use of GPS SPS as a Category I positioning source assumes that Selective Availability (SA), an intentional offset induced into GPS, is set to zero. When this Manual was promulgated, SA was set to zero and the Department of Defense (DoD) had no intention of ever employing its use on a worldwide scale. However, personnel involved with navigation must be aware that DoD may select signal degradation regionally using SA or other tactics. Therefore, cutters deploying abroad may require the use of PPS or other enhancement to ensure accurate fix information is being received. When intentional GPS signal degradation such as SA is being used, SPS shall be considered a Category II source, not adequate for navigation in Harbor, Harbor Approach, Near Coastal and other restricted waters.

2. Fixes.

- a. One of the following criteria must be met in order to constitute a fix on a paper chart or on an electronic navigation system:
 - (1) Electronically provided position when displayed on a chart from an adequate positioning source, as defined in Section B.1. of this Chapter.
 - (2) The intersection of lines of position (LOP) from at least three prominent points of land, fixed, and/or celestial objects with a separation of 15 degrees or greater. This includes radar/chart matching capability.
 - (3) When using relative bearings, a minimum of two visual LOPs and one radar range shall be used.
- b. A fix shall not be erased or deleted because it appears in error; rather, another fix shall be taken immediately to ascertain the vessel's position.
- c. Fixes shall be verified by all available means including:

- (1) Soundings.
- (2) Aids to Navigation (AtoN).
- (3) Radar or other electronic means.
- (4) Seaman's Eye.

3. Estimated Position.

- a. An Estimated Position (EP) is a Dead Reckoning (DR) position modified by additional information, which in itself is insufficient to establish a fix.
- b. EPs shall be compared to all available information such as:
 - (1) Soundings.
 - (2) Aids to Navigation (AtoN).
 - (3) Seaman's Eye.

4. Charts.

- a. All charts used shall be of the best scale available for the mission. The "best scale" may not always be the largest available scale, depending on navigational and operational requirements.
- b. Prior to use, charts shall be up-to-date.

CHAPTER 3. ADDITIONAL REQUIREMENTS FOR CUTTER NAVIGATION

A. General.

1. The ship's intended route shall be identical on all charts and electronic systems used for navigation and labeled with the true course of each track leg. When navigating on paper charts the magnetic course shall also be included. CIC/CSC navigation charts, if applicable, shall be compared to the bridge navigation charts for consistency.
2. On cutters with a CIC/CSC, the bridge navigation plot shall normally be designated as the primary navigation plot. Navigation information maintained in CIC/CSC shall normally be designated as the secondary navigation plot, supplementing the primary plot. The commanding officer may authorize a shift in the location of the primary plot to suit a particular situation (e.g., restricted visibility).
3. If conditions permit, gyro error shall be determined at least once daily while underway. When gyro error is obtained, gyrocompass(es) and repeaters shall be compared and errors posted and entered into electronic navigation systems.
4. The ship's position shall be fixed at an interval that ensures safe navigation, not to exceed one hour.
5. If navigating with paper charts:
 - a. Set and drift shall be determined at every fix if the fix interval is three minutes or greater.
 - b. If the fix interval is less than three minutes, set and drift shall be determined at least every second fix.
 - c. Set and drift shall be applied to subsequent DR positions to determine an EP in the event that planned fixes are not obtained.
 - d. Every fix shall be labeled and have a properly labeled DR track projected ahead for at least two fix intervals.
6. At each fix interval, the Navigation Evaluator shall provide a navigation report to the conning officer, as required by the Command Navigation Standards.

B. Restricted Waters.

1. While transiting in restricted waters, true or magnetic course and distance of each track leg shall be labeled on a paper chart or available in an electronic navigation system. Danger bearings/ranges to navigation hazards not marked by navigation

aids, and turn bearings/ranges shall be plotted on paper charts. Slide lines allowing for the ship's tactical data for the intended speed/rudder combination should also be plotted on paper charts.

2. Bridge and CIC/CSC shall not shift paper charts at the same time, nor shall they shift during, or at the time of, an impending turn. The bridge or CIC/CSC shall have a fix plotted before the next station shifts charts.
3. Tide and current information shall be available at all conning stations and in CIC/CSC, if applicable. Graphing of tide and current information is recommended.

CHAPTER 4. ADDITIONAL REQUIREMENTS FOR BOAT NAVIGATION

A. General.

1. When navigating with paper charts, fixes shall be plotted at 30-minute intervals. Fixes may be timed to coincide with ops/position reporting to the Operational Commander (OPCON). Fixes shall become more frequent whenever the Coxswain is operating in an unfamiliar area and during periods of restricted visibility.
2. Maintain a Dead-Reckoning plot as required by the Command Navigation Standards.
3. Any time the Coxswain is uncertain of their position, they shall stop all way or anchor if necessary and fix the boat's position.
4. In accordance with Command Navigation Standards, Coxswains shall maintain their own copy of up-to-date ready charts with permanent standard track-lines, courses, and turn bearings along established routes and waypoints. These charts can be folded and must be available for immediate reference.

B. Restricted Waters.

1. When navigating within restricted waters designated by the CO/OIC, using paper charts, a fix shall be plotted at least every 15 minutes.
2. Coxswains transiting close to navigation hazards and shoals, during restricted visibility or darkness, or operating in an unfamiliar area shall operate the vessel with extreme caution, which may include:
 - a. Coordinating the boat crew as a navigation team to specifically observe the compass heading, fathometer, radar, electronic navigation systems, or otherwise augment the Coxswain's navigational ability.
 - b. Reducing speed.
 - c. Coming to "All Stop" to review the navigation picture.
 - d. Utilizing navigational data such as soundings, danger ranges, or bearings to verify position.
 - e. Increasing fix frequency.

- C. Additional Requirement for Non-Standard Boat (NSB) Navigation. At a minimum, CO/OIC shall ensure NSB's (not including work/flood punts and ice skiffs) have the capability to obtain a fix by electronic means (i.e. GPS, (handheld or installed), radar, chart plotter, etc.).

CHAPTER 5. ELECTRONIC NAVIGATION SYSTEMS

A. Coast Guard Electronic Navigation Systems.

1. The Coast Guard has three general classifications of systems that are authorized for use as the primary means of navigation.
 - a. Electronic Charting and Integrated Navigation System (ECINS).
 - b. Electronic Chart System (ECS).
 - c. Scalable Integrated Navigation System (SINS).
2. Each system has its own unique capabilities and limitations.
3. The type of system(s) installed varies by platform throughout the Coast Guard.
4. WARNING: When using vector format products, some charted features with navigational significance can be hidden from view if:
 - a. The chart is zoomed/scaled out too far. (Chart features, such as soundings and buoys may disappear for de-cluttering purposes.)
 - b. Specific charted features have been removed from the display by a user.
 - c. Time varying objects exist on the chart in use. (Seasonal AtoN can be set to automatically be removed from the display during the scheduled removal dates published in the Light List.)

B. Electronic Charting and Integrated Navigation System (ECINS).

1. General. The Coast Guard employs several ECINS that are intended to meet or exceed international and Navy requirements, but include some deliberate additions to, and deviations from, those standards, policies and agreements.
2. General ECINS Usage.
 - a. ECINS may be used as the primary means of navigation in lieu of paper charts if the following conditions are met:
 - (1) An adequate primary positioning source (see figure 2-1) is in use.
 - (2) Approved up-to-date electronic chart data as described in Chapter 6 is in use.

- (3) Adequate back-up arrangements are available including:
 - (a) Back-up Positioning Source. Examples of adequate back-up positioning sources for GPS/DGPS include visual and/or radar lines of position entered into ECINS or radar/chart matching on ECINS.
 - (b) Back-up System - Adequate back-up arrangements shall enable the continuous operation of essential ECINS functions during a failure of the ECINS to ensure that a failure does not result in a potentially dangerous situation. This includes a timely transfer of route monitoring functions.
- b. Enclosure (5) outlines paper chart carriage requirements while using ECINS as the primary means of navigation.
- c. In the case of failure of the primary electronic positioning source, where the ECINS is otherwise fully functional, it is possible to navigate using other available position sources with the ECINS. The cutter navigation team shall maintain proficiency in the use of all available positioning sources with the ECINS (e.g. Visual/Radar Navigation).
- d. In the case of an ECINS failure where a back-up ECS is in use, at the CO/OIC's discretion, the cutter may:
 - (1) Repair the ECINS while underway if repairs can be made within a *reasonable time period* and navigate with Electronic Chart System (ECS) as primary means of navigation. Up-to date paper charts are not required.
 - (2) Correct paper Harbor and Approach charts and return to port where repair to the primary system can be affected. The ECS may be used as the primary means of navigation during the transit.
 - (3) Correct the appropriate paper charts, and navigate using ECS and/or up-to-date paper charts as appropriate to complete mission.
- 3. System Usage in Restricted Waters. This section establishes additional requirements while transiting in or near restricted waters.
 - (1) Compare the primary positioning source to a backup positioning source at least every third fix interval.
 - (2) Maintain sounding (i.e. fathometer) alarm.
 - (3) Maintain Anti-grounding alarms (i.e. ECINS alarms) at CO/OIC discretion.

C. Electronic Chart System (ECS). The Coast Guard employs ECS that are based upon the Radio Technical Commission for Maritime Services (RTCM) recommended minimum standards, but include some deliberate additions to those standards.

1. ECS Usage by Cutters. An ECS is primarily used as a situational awareness tool but may also be used in the following manner:

a. ECS may be used as the primary means of navigation in open ocean in lieu of paper charts if the following conditions are met:

(1) An adequate primary positioning source as listed in figure 2-1 is in use.

(2) Approved up-to-date electronic chart data as described in Chapter 6 is in use.

(3) An appropriate folio of up-to-date paper charts is available to transfer the primary navigation plot to paper within one fix interval.

b. ECS may be used as a backup system to ECINS if the following conditions are met:

(1) An adequate primary positioning source as listed in figure 2-1 is in use.

(2) Approved up-to-date electronic chart data as described in Chapter 6 is in use.

(3) The planned route from the ECINS is in use on the ECS.

2. ECS Usage by Boats. ECS may be used as the primary means of navigation if the following conditions are met:

a. An adequate primary positioning source as listed in figure 2-1 is in use.

b. Approved up-to-date electronic chart data as described in Chapter 6 is in use.

c. Up-to-date paper charts are onboard to transfer the primary navigation plot to paper within one fix interval.

d. Command promulgated standard waypoints and routes are used.

e. Coxswain observes radar, fathometer, visual ranges, and AtoN in order to verify the displayed position.

D. Scalable Integrated Navigation System (SINS) for Boats. The Coast Guard employs SINS that are intended to meet international requirements for small craft radar. SINS include additional chart plotting and limited navigational functionality but do not meet the recommended minimum standards for ECS.

1. SINS Usage. SINS may be used as the primary means of navigation on boats if the following conditions are met:
 - a. An adequate primary positioning source as listed in figure 2-1 is in use.
 - b. Approved up-to-date electronic chart data as described in Chapter 6 is in use.
 - c. Up-to-date paper charts are onboard to transfer the primary navigation plot to paper within one fix interval.
 - d. Command promulgated standard waypoints and routes are used.
 - e. Coxswain observes radar, fathometer, visual ranges, and AtoN in order to verify the displayed position.
 - f. Depth alarms are set to the navigational draft.
 - g. Cross Track Error Alarm is enabled when navigating to a waypoint.
 - h. Radar and Chart are displayed at all times.

CHAPTER 6. ELECTRONIC CHART DATA

- A. General. Electronic Charts consist of chart data that has been developed for presentation on electronic navigation systems.
- B. Approved Electronic Chart Data. The Coast Guard has approved the following electronic chart data for use with electronic navigation systems:
1. Official Electronic Navigational Charts (ENC) produced or issued by or on the authority of a government authorized hydrographic office.
 2. Digital Nautical Charts (DNC) produced and issued by the National Geospatial-Intelligence Agency (NGA).
 3. Official Raster Navigational Charts (RNC) produced or issued by or on the authority of a government authorized hydrographic office.
 4. Commercial vector and/or raster charts procured by the Coast Guard Electronic Chart Manager.

NOTE: Some electronic charts procured and distributed by the Coast Guard are for situational awareness only:

- a. Charts designated as private source data.
 - b. Clearly designated Caribbean RNCs which may contain questionable datums.
- C. Up-To-Date Electronic Chart Data. An Electronic Chart is considered up-to-date if it has been corrected within the last forty-five days. The approved methods are:
1. Electronic chart full-file replacement.
 2. Applying official updates (e.g. ENC updates, Vector Product Format (VPF) Database Updates, raster updates (patches)).
 3. Manual corrections, using data provided by:
 - a. The cognizant hydrographic office (e.g. National Oceanic and Atmospheric Administration (NOAA), Canadian Hydrographic Service (CHS), United Kingdom Hydrographic Office (UKHO), etc).
 - b. Local Notice to Mariners.
 - c. Broadcast notifications (e.g. Broadcast Notices to Mariners, HydroLants, etc.).

NOTE: Temporary corrections may be manually entered into the electronic navigation system.

- D. Recommended Chart Type Hierarchy. The following recommended hierarchy is intended to aid with the chart selection process. Variances are allowed at the discretion of the Navigator. Navigators shall consult the latest chart advisories provided by the Electronic Chart Manager:
1. Official ENC.
 2. Official RNC.
 3. DNC®.
 4. Commercial vector chart.
 5. Commercial raster chart (e.g. Caribbean and Central America procured RNC charts).
- E. Electronic Chart Data Selection. For electronic navigation systems that render multiple chart types, selecting the appropriate electronic chart product is based upon several factors. The following steps are intended to help with the selection process:
1. Determine what type of data the system can render.
 2. Determine the available coverage for the area of operations. In US coastal waters, NOAA data shall take precedence. In US inland waters (Western Rivers), USACE data shall take precedence.
 3. Select the best scale chart product for that area and for the mission being conducted.
 4. Of the available chart types, determine which charts are most up-to-date.
 5. Scale and most up-to-date must be weighed together in determining the best chart for navigation.
- F. Electronic Chart Scaling.
1. An Electronic Chart is most accurately viewed when displayed at its source scale. Scaling/Zooming in or out will distort the visual relative distance between own ship or boat and the chart object. In addition, cursor-indicated positions for charted features vary when scaling the chart.
 2. When Radar and Electronic Chart information are presented together on the same display, the scale shall be closely matched. Scaling out the Radar to 24 nm for example, when the Electronic Chart is scaled to only 3 nm can cause misinterpretations.

CHAPTER 7. CELESTIAL NAVIGATION

A. General. This section states the basic requirements for celestial navigation. Nothing in this section shall be construed so as to relieve members of their responsibility for the completion of celestial navigation portions of references (g) and (h).

B. Proficiency.

1. WAGB (except USCGC MACKINAW), WHEC, WMEC, WIX and D14 and D17 WLM and WLB class cutters, shall maintain proficiency in the art of celestial navigation.
2. To be considered proficient, cutters must be able to:
 - a. Manually determine the time of sunrise and sunset.
 - b. Manually determine the time of moonrise and moonset.
 - c. Manually determine gyro error by azimuth of the sun or other celestial body.
 - d. Manually determine gyro error by amplitude of the sun or other celestial body.
 - e. Obtain an LOP from the sun.
 - f. Observe Local Apparent Noon (LAN). Manually reduce sighting and determine ship's latitude.
 - g. Obtain the ship's position by reducing celestial objects to a fix.
 - h. Manually compute latitude and gyro error by Polaris.
3. Weather and operations permitting, cutters shall take advantage of opportunities to maintain proficiency in celestial navigation.

C. Requirements.

1. All celestial work must be documented in the ship's Navigation Workbook.
2. Units using the System To Estimate Latitude and Longitude Astronomically (STELLA) computer software application to perform celestial computations shall follow the guidelines in Chapter 9.
3. Chronometers are no longer required to be carried onboard. Observation time(s) can be obtained from an electronic clock that is synchronized with the GPS time signal.

CHAPTER 8. NAVIGATION PLANNING AND BRIEFS

A. Navigation Planning.

1. Purpose. Navigation planning encompasses the development of long and short-term plans as well as contingency plans for a mission. Command Navigation Standards, Standing Orders, operational bills and navigation checklists constitute pre-established long-term operational plans for safe and successful navigation. These plans provide a framework for executing a mission, and may be tailored to meet the unique requirements of each mission. The plan may be very elaborate, consisting of complete track lines, piloting procedures, patrol areas, etc., or simply a brief to the crew before launching a boat.
2. Reference Publications. Up-to-date nautical and hydrographic publications (or the electronic equivalents) should be consulted during the development of these plans, for example:
 - a. Coast Pilots.
 - b. Fleet Guides.
 - c. Sailing Directions.
 - d. Code of Federal Regulations, Title 33.
 - e. OPORDERS.
 - f. Coast Guard Navigation Center, Navigation Information Service.
 - g. Naval Operating Area Instructions.
 - h. Light List(s) and the List of Lights.
 - i. Radio Aids to Navigation, PUB 117.
 - j. Notices to Mariners, Local Notices to Mariners and Broadcast Notices to Mariners.
 - k. NAVAREA, HYDROLANT, HYDROPAC Messages.
 - l. Tide Tables.
 - m. Tidal Current Tables.
 - n. Nautical Almanac.
 - o. Navigation Rules, International-Inland, COMDTINST M16672.2 (series).
 - p. Local weather resources.
 - q. Other local navigation guides.

B. Navigation Briefs.

1. Cutter Briefs.

- a. General. As per reference (a), the Navigator is charged with preparing a safe and prudent navigation plan for the movement of the cutter. This plan shall be the basis of the navigation brief and shall be conducted prior to getting underway, entering port and, if possible, prior to entering restricted waters. Navigation brief duration, content and attendance may be tailored to meet the requirements of a specific mission.
- b. Chart Review. The Navigator or Assistant Navigator shall review all charts to ensure hazards to navigation along the intended route, including overhead obstructions, prohibited areas and shoal water, are properly displayed and/or highlighted. Charts with tracklines in restricted waters shall be reviewed by both the Navigator and Assistant Navigator.
 - (1) When navigating with electronic charts, all electronic chart products available along the intended route shall be consulted to ensure all available updates for the area have been accounted for.
- c. Required Information. Navigation briefs shall include the following information, when applicable:
 - (1) Anticipated time of setting Special Sea Detail, Anchoring and Mooring Bills, Engineering Restricted Maneuvering Doctrine, and Navigation Detail.
 - (2) Assignment of navigation team positions and review of duties as outlined in Enclosure (3).
 - (3) Chart selection and/or electronic chart product selection.
 - (4) Chart shifts.
 - (5) Review of charts and intended track, including results of scanned route, if applicable.
 - (6) Restricted, prohibited, and cautionary areas along intended track.
 - (7) Chart datum (NAD 83, WGS 84, etc.).
 - (8) Planned fix interval.
 - (9) Maximum allowable deviation from track.
 - (10) Speed of advance and maximum safe speed.
 - (11) Intended speed/rudder combination for turns.

- (12) IALA buoyage system.
 - (13) Expected sightings and description of key aids to navigation.
 - (14) Navigation equipment status.
 - (15) ECINS/ECS back-up arrangements, if applicable.
 - (16) Status of electronic position fixing systems (GPS/DGPS, LORAN) to include expected accuracy and outages.
 - (17) Engineering plant status.
 - (18) Hazards to navigation, danger bearings/ranges, danger soundings, navigation warnings, bridge vertical clearances, bridge signals and radio capability.
 - (19) Areas where the cutter can/cannot anchor in emergencies.
 - (20) Anticipated traffic (Cutters should avoid meeting Deep Drafts vessels at turns and intersections).
 - (21) Traffic Separation Schemes.
 - (22) Port or Vessel Traffic Service (VTS) requirements.
 - (23) Environmental considerations including tides, currents, weather (e.g., winds, precipitation, visibility), and environmentally sensitive sea areas (e.g., marine sanctuaries).
 - (24) Demarcation lines (Inland/International Rules of the Road).
 - (25) Communication requirements.
 - (26) Mooring or anchoring arrangements including time to moor/unmoor and berth heading.
 - (27) Ordnance disposal areas.
 - (28) Conduct risk assessment in accordance with ref (d) (GAR model).
- d. Debrief. Cutters are encouraged to conduct a debrief following navigation evolutions to evaluate and recognize performance.

2. Boat Crew Briefs.

- a. General. A boat crew brief shall be conducted prior to getting underway and prior to entering restricted waters. Crew briefs should be tailored to meet the requirements of the specific mission.

- b. Required Information. Crew briefs shall include the following information, when applicable:
- (1) Conduct risk assessment in accordance with ref (d) (GAR model).
 - (2) Crew position assignments.
 - (3) Review of charts and intended track/patrol area.
 - (4) Safe speed for mission and/or conditions.
 - (5) Hazards to navigation.
 - (6) Anticipated traffic.
 - (7) Environmental considerations including tides, currents, weather (e.g., winds, precipitation, visibility), and environmentally sensitive sea areas (e.g., marine sanctuaries).
- c. Debrief. Boat crews shall conduct a post-mission debrief to evaluate and recognize performance.

CHAPTER 9. CUTTER LOGS, RECORDS AND CHECKLISTS

A. General. This section outlines the procedures and requirements for maintaining navigational records. In accordance with reference (i), regardless of any authorization contained in this Manual, records directly related to the following matters shall not be destroyed until final clearance or settlement:

1. An outstanding claim for or against the United States.
2. A case under litigation.
3. An incomplete investigation.

B. Electronic Logs.

1. Units using an ECINS as their primary means of navigation are authorized to use the system's voyage-recording feature in lieu of the Ship's Position Log, Standard Bearing Book, and the Navigation Data Sheet (CG-4380C) if the following information, at a minimum, is recorded by the system:
 - a. Date/Time.
 - b. Primary positioning source in use.
 - c. Latitude/Longitude position from primary positioning system.
 - d. Course Over Ground (COG)/Speed Over Ground (SOG).
 - e. True Heading.
 - f. Logged Speed.
 - g. Chart in use by the system.
 - h. Visual/Radar Objects and LOPs used (If applicable).
 - i. Depth.
2. Electronic navigation records shall be printed out or maintained on removable media, maintained locally for three years after the date of the final entry, and then should be destroyed/deleted.
3. Units storing records on removable media must ensure the records remain readable on the currently installed system throughout the three-year retention period.

C. Deck Logs.

1. The Deck Log (CG-4380A, CG-4380B and CG-4380C) shall be maintained in accordance with reference (j).
2. When navigating with automatic ship control systems such as Autopilot or Dynamic Positioning System, the mode in use must be logged in accordance with the Command Navigation Standards.

D. Ship's Position Log (OPNAV Form 3100/3). A Ship's Position Log is a record of Latitude and Longitude positions and soundings from all positioning sources and shall be used during coastal and open ocean navigation. When visual bearings and radar ranges are used to determine the cutter's position, the Ship's Position Log may be secured and the Standard Bearing Book may be used. This log shall be maintained locally for three years after the date of the final entry, and then should be destroyed.

E. Standard Bearing Book (OPNAV Form 3530/2). The Standard Bearing Book is a record of the data obtained to determine the ship's position by visual bearings, sextant angles, radar ranges and electronic LOPs. It shall be maintained in accordance with the procedures described below. The Standard Bearing Book shall be kept locally for three years after the date of the final entry, and then should be destroyed.

1. The chart number in use shall be recorded at the top of the initial page each day. Each shift of charts shall be noted in the first available blank line.
2. The time zone and date shall be indicated.
3. Radar ranges shall be labeled YD (yards) or NM (nautical miles).
4. Soundings shall be recorded at the time each fix is obtained and labeled FT (feet), FM (fathoms) or M (meters).
5. All bearings are true, unless otherwise indicated by R (relative) or M (magnetic). When shifting to R (relative), the shift shall be noted on the first available blank line and the ship's heading shall be recorded with each fix.
6. All abbreviations shall be in accordance with reference (l).
7. Gyro error shall be recorded at the top of the initial page each day. Any revised gyro error shall be noted in the first available blank line. Radar range error, if determined, shall be entered at the top of the initial page each day.
8. A list of navigation aids must be maintained in the bearing book or maintained as part of a gazetteer containing lists of charted objects for all piloting charts. If a gazetteer is maintained, it must be kept in close proximity to the plotting station for ready reference. Object lists must include the chart number, object proper name, latitude and longitude, and alpha-numeric designation of the object. Object lists maintained on the bridge and in CIC/CSC must be identical.

9. At the end of the watch or navigation detail the bearing recorder shall sign the Standard Bearing Book on the next available line.
- F. Navigation Workbook (OPNAV Form 3530/1). The Navigation Workbook is a record of observations and computations used for navigation of the ship. This shall include data relating to celestial lines of position, tides, currents and gyro error. In view of the large amount of data that may be recorded, ships may organize data into separate notebooks as directed by the CO/OIC. The Navigator shall review each computation and sign the workbook as appropriate. The Navigation Workbook and all electronic records shall be kept locally for three years after the date of the final entry, and then should be destroyed.
1. When using computer software for computations, the results may be printed and maintained with the navigation workbook or stored electronically, in a retrievable format.
 2. Units using the STELLA software package to perform celestial computations must print out the STELLA navigation log after each celestial observation.
 3. Locally prepared strip forms, if used, shall be affixed to or recorded in the workbook.
 4. If calculators are used, enough data must be recorded in the workbook to reconstruct the computation.
- G. CIC/CSC Navigation Log. The purpose of the CIC/CSC Navigation Log is to provide a record of the data obtained to determine the ship's position by radar when navigating using paper charts. When in use, it shall be maintained by CIC/CSC in accordance with the procedures described below. The CIC Navigation Log shall be kept locally for three years after the date of the final entry, and then should be destroyed.
1. The date, chart number and gyro error shall be entered at the top of each page. Any revised gyro error shall be noted in the log. The radar range error, if determined, shall be entered at the top of the initial page each day.
 2. The following information shall be logged at the time of each fix:
 - a. Identification of landmarks used.
 - b. Ship's position relative to track.
 - c. Recommended course and speed.
 - d. Nearest shoal water.
 - e. Distance to turn.

- f. Time to turn.
 - g. Nearest aid to navigation.
 - h. Soundings at the time each fix is obtained, labeled FT (feet), FM (fathoms) or M (meters).
 - i. Set and drift (as required).
 - j. Any pertinent remarks (e.g., conn concurs or does not concur).
- 3. When the navigation detail is secured, an entry shall be made on the next available line in the log. A single line shall be drawn through the remainder of the page with the log keeper's signature appearing on the line.
 - 4. Radar ranges shall be labeled YD (yards) or NM (nautical miles).
 - 5. All abbreviations shall be in accordance with U.S. Chart No. 1, Nautical Chart Symbols and Abbreviations, unless promulgated separately in the log.
 - 6. A list of navigation aids must be maintained in the CIC Navigation Log or maintained as part of a gazetteer containing lists of charted objects for all piloting charts. If a gazetteer is maintained, it must be kept in close proximity to the plotting station for ready reference. Object lists must include the chart number, object proper name, latitude and longitude, and alpha-numeric designation of the object. Object lists maintained on the bridge and in CIC/CSC must be identical.
- H. Captain's Night Orders. The Captain's Night Order Book has been traditionally maintained in bound ledger or loose-leaf form. The orders for each night are written and signed by the commanding officer as required by reference (a). They include such items as courses and speeds to be maintained throughout the night, expected sightings, engineering data, the tactical situation, and supplementary orders to the Officer of the Deck (OOD). CO/OICs may optionally use electronic media to convey night orders to the crew. With either option, safeguards must be in place to ensure that the Deck Watch Officers and other key personnel acknowledge the orders. The Captain's Night Order Book shall be retained on board for three years after the date of the last entry, and then should be destroyed.
- I. Checklists. Getting underway and entering port/approaching restricted waters checklists shall be created, maintained and completed in accordance with enclosures (8) and (9). Checklists shall be maintained locally until no longer useful and then destroyed.

Appendix A. Glossary

TERM	DEFINITION
Anti-grounding Alarm	A function within electronic navigation systems that uses hydrographic data within a vector chart to alert the mariner when the vessel is approaching any charted feature (i.e. spot sounding/depth contour or land) that is less than the navigational draft selected by the operator. <i>Also see sounding alarm.</i>
Back-up Positioning Source	A positioning source from the same category as the primary positioning source that does not rely on any elements in common with the primary positioning source (e.g., a second GPS/DGPS receiver is not an adequate back-up positioning source for a GPS/DGPS receiver). Examples of adequate back-up positioning sources for GPS/DGPS include visual and/or radar lines of position entered into ECINS or radar/chart matching on ECINS.
Back-up System	A fully integrated redundancy within the ECINS (e.g., an ECINS with multiple computers), dual-redundant ECINS, or a separate independent ECINS or ECS. Adequate back-up arrangements shall enable the continuous operation of essential ECINS functions during a failure of the ECINS to ensure that a failure does not result in a potentially dangerous situation. This includes a timely transfer of route monitoring functions.
Electronic Chart Display and Information System (ECDIS)	A navigation information system which with adequate backup arrangements can be accepted as complying with the up-to-date chart required by regulation V/20 of the 1974 SOLAS Convention, by displaying selected information from a system electronic navigational chart with positional information from navigation sensors to assist the mariner in route planning and route monitoring and by displaying additional navigation-related information.
Electronic Charting and Integrated Navigation System (ECINS)	Navigation systems in use by the Coast Guard that are intended to meet or exceed international and Navy requirements, but include some deliberate additions to, and deviations from, those standards, policies and agreements. <i>Coast Guard requirements for ECINS functionality are primarily derived from the international standards for Electronic Chart Display and Information Systems (ECDIS) and Integrated Navigation Systems (INS), with additional required capabilities taken from the U.S. Navy ECDIS Policy and the North Atlantic Treaty Organization (NATO) Standardization Agreement (STANAG) on Warship ECDIS (WECDIS).</i>

TERM	DEFINITION
Electronic Chart Manager	The office designated by Commandant (G-O) to certify electronic chart data suitable for navigation, procure and distribute approved commercial electronic chart data, and be the System Management & Engineering Facility (SMEF) for electronic chart data used by navigation systems employed within the Coast Guard
Electronic Chart System (ECS)	Navigation systems that are based upon the Radio Technical Commission Maritime Services (RTCM) recommended minimum standards for ECS, but include some deliberate additions to those standards.
Electronic Navigational Chart (ENC)	<p>A vector database, standardized as to content, structure and format produced by or issued on the authority of a government authorized hydrographic office. An ENC contains all the chart information necessary for safe navigation, and may contain supplementary information in addition to that contained on a paper chart (e.g., sailing directions), which may be considered necessary for safe navigation. The symbology used to represent an ENC to the mariner is based upon IHO Chart INT 1 and is maintained in the IHO ECDIS Presentation Library.</p> <p><i>In U.S. coastal waters, official ENC data is produced by the National Oceanic and Atmospheric Administration (NOAA) National Ocean Service (NOS) Office of Coast Survey (OCS). In U.S. inland waters, official Inland ENC (I-ENC) data is produced by the US Army Corps of Engineers (USACE).</i></p>
Digital Nautical Chart (DNC®)	A vector database produced by the National Geospatial-Intelligence Agency (NGA). A DNC contains all the chart information necessary for safe navigation of ocean-going vessels, and may contain supplementary information in addition to that contained on a paper chart (e.g., fleet guide), which may be considered necessary for safe navigation. DNC data is rendered using NGA's Geospatial Symbols for Digital Displays (GeoSym®), which is based upon the IHO ECDIS Presentation Library and IHO Chart INT 1.
Navigational draft	The minimum depth of water normally required for the safe navigation of the vessel. The navigational draft is determined by the CO/OIC.

TERM	DEFINITION
Raster Format	<p>The real world is portrayed by a scanned image, essentially a digital picture of a paper chart. The image is made up of a rectangular grid comprised of color and position information for each location on the grid. Such a location is often referred to as a picture element or pixel.</p> <p><i>Examples of raster format electronic chart data used in the Coast Guard include BSB format (used by Maptech to produce the NOAA RNC product and Nautical Data International (NDI) to produce the Canadian Hydrographic Service (CHS) RNC product), Hydrographic Chart Raster Format (HCRF) (used by the United Kingdom Hydrographic Office (UKHO) for their Admiralty Raster Chart (ARCS) product and Australian Hydrographic Service for their Seafarer RNC product).</i></p>
Raster Navigational Chart (RNC)	<p>A facsimile of a paper chart produced by or issued on the authority of a government authorized hydrographic office. The symbology for RNC is dependent on the symbology used in the source paper chart: The symbology for RNC in the U.S. is based upon U.S. Chart No. 1, while the symbology used in international charts is typically based upon IHO Chart INT 1.</p> <p><i>In the U.S., official RNC data is produced by the National Oceanic and Atmospheric Administration (NOAA) National Ocean Service (NOS) Office of Coast Survey (OCS).</i></p>
Scalable Integrated Navigation System (SINS) for Boats	<p>Navigation systems that are intended to meet international requirements for small craft radar. SINS include additional chart plotting and limited navigational functionality but do not meet the recommended minimum standards for ECS.</p>
Slide line	<p>A line plotted on the paper chart parallel to the next track leg, used to account for cross-track error when determining wheel-over point.</p>
Sounding Alarm	<p>A function, using the fathometer, which alerts the mariner when the vessel encounters a specific depth beneath the keel. <i>Also see Anti-grounding alarm.</i></p>
Turn Bearing	<p>A bearing to a charted object marking a specific point along the track-line at which the vessel should begin its turn (wheel-over point).</p>
Turn Range	<p>A range to a charted object marking a specific point along the track-line at which the vessel should begin its turn (wheel-over point).</p>

TERM	DEFINITION
Up-To-Date Paper Charts	Paper Charts are considered to be up-to-date if all available corrections from Local Notices to Mariners and other applicable sources have been applied.
Up-To-Date Electronic Charts	<p>Electronic Charts are considered up-to-date if they have been corrected within the last forty five days using one of the following methods:</p> <ol style="list-style-type: none"> 1. Electronic chart full-file replacement. 2. Applying official updates (e.g. ENC updates, VPF Database Updates, raster updates (patches)). 3. Manual corrections, using data provided by: <ol style="list-style-type: none"> a. The cognizant hydrographic office (e.g. NOAA, CHS, UKHO, etc). b. Local Notice to Mariners. c. Broadcast notifications (e.g. Broadcast Notice to Mariners, HydroLants, etc.)
Vector Format	<p>The real world is portrayed as points, lines and polygons, with text labels. This representation is derived from objects and attributes in a database. This database can be queried and can be used for such functions as Anti-Grounding alerts.</p> <p><i>Examples of vector format electronic chart data used in the Coast Guard include ENC, Inland ENC, DNC®, TX-97 (a proprietary format of Transas), NTX (a proprietary format used by OSI) and CM93 (a proprietary format of C-Map).</i></p>

Appendix B. Acronyms

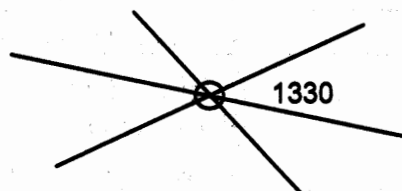
ACRONYM	DEFINITION
AOR	Area of Responsibility
AtoN	Aids to Navigation
CHS	Canadian Hydrographic Service
CIC	Combat Information Center
CO/OIC	Commanding Officer/Officer in Charge
COMDAC-INS	Command and Display Control Integrated Navigation System
CSC	Combat Support Center
DGPS	Differential Global Positioning System
DNC	Digital Nautical Chart
DoD	Department of Defense
DR	Dead Reckoning
ECDIS	Electronic Chart Display and Information System
ECINS	Electronic Charting and Integrated Navigation System
ECPINS	Electronic Chart Precise Integrated Navigation System
ECS	Electronic Chart System
ENC	Electronic Navigational Chart
EP	Estimated Position
GPS	Global Positioning System
LNTM	Local Notice to Mariners
LOP	Line of Position
MOB	Man Overboard
NATO	North Atlantic Treaty Organization
NGA	National Geospatial-Intelligence Agency
NOAA	National Oceanic and Atmospheric Administration
NSB	Non-standard Boat
NTM	Notice to Mariners
OPCON	Operational Commander
OSI	Offshore Systems International
PPS	Precise Positioning Service
RNC	Raster Navigational Chart
RTCM	Radio Technical Commission for Maritime Services
SA	Selective Availability
SCCS	Shipboard Command and Control System
SINS	Scalable Integrated Navigation System

ACRONYM	DEFINITION
SMEF	System Management & Engineering Facility
SPS	Standard Positioning Service
STANAG	Standardization Agreement
STELLA	System To Estimate Latitude and Longitude Astronomically
UKHO	United Kingdom Hydrographic Office
VMS	Voyage Management System
VPF	Vector Product Format
WAAS	Wide Area Augmentation System
WECDIS	Warship Electronic Chart Display and Information System

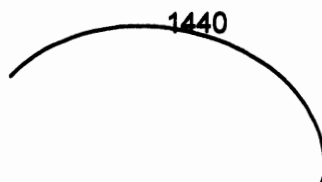
Navigation Plotting Symbols



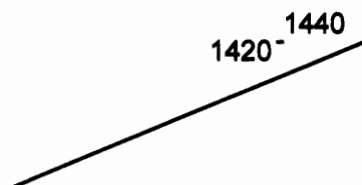
Single line of position
(Same for visual and electronic LOP)



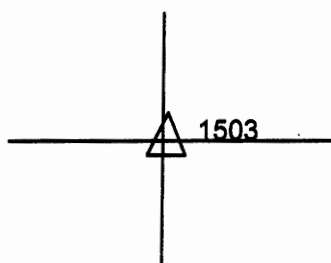
Visual fix



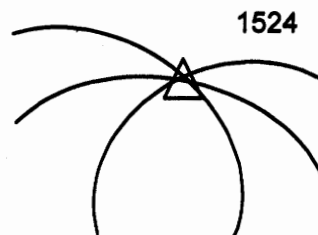
Distance arc or range



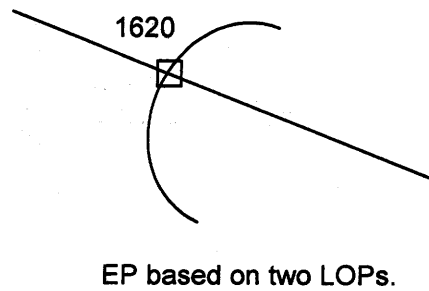
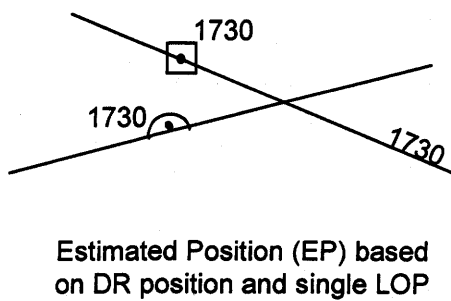
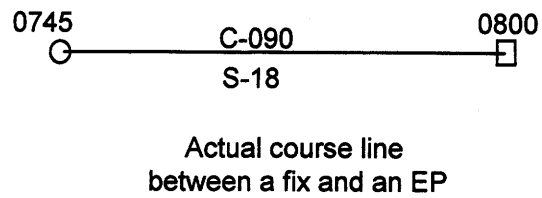
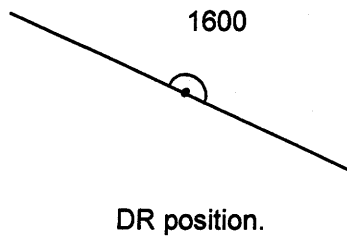
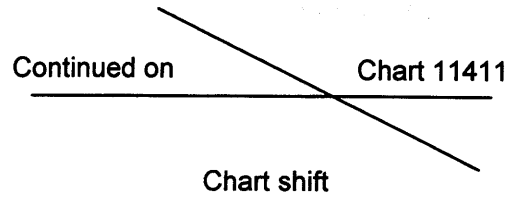
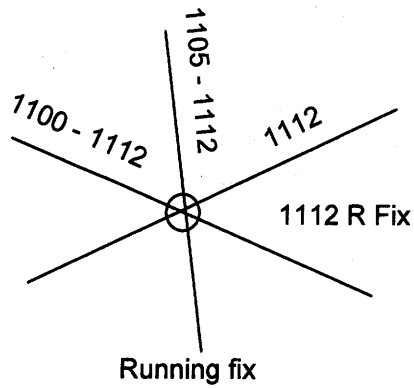
Advanced LOP
Original time and time LOP advanced to

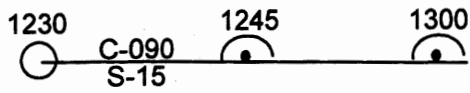


Electronic fix

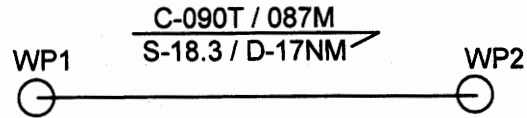


Electronic fix
using radar ranges

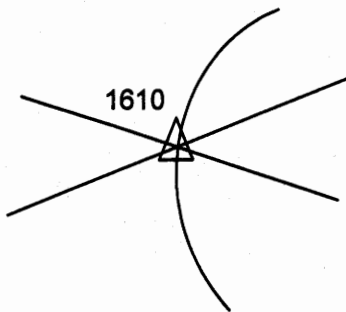




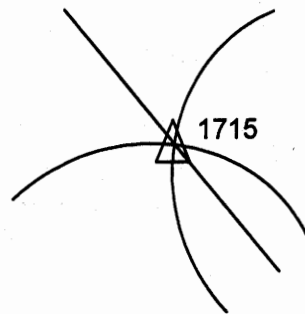
DR course line



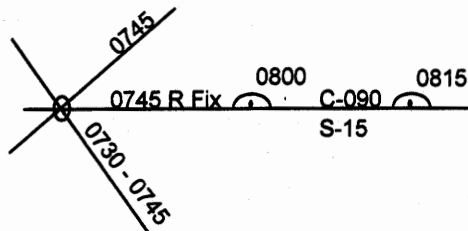
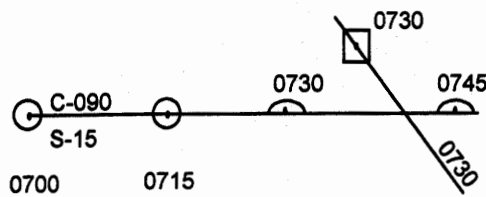
Trackline. Used between intended waypoints.



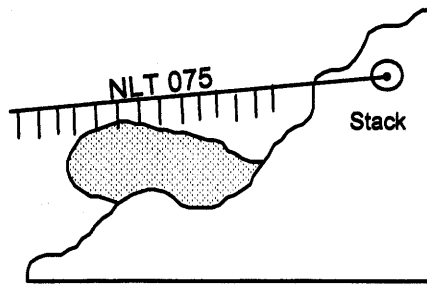
Two visual bearings and one radar range



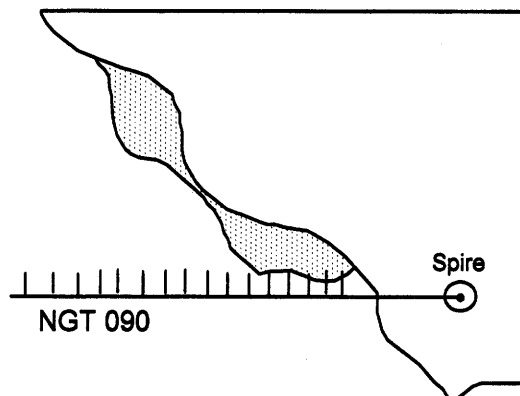
Two radar ranges and one visual bearing.



Examples of a DR course line with an EP and a DR course line with a running fix



Danger bearing No Less Ihan 075 Deg T



Danger bearing No Greater Ihan 090 Deg T

Line Handling Commands

This enclosure provides a list of standard linehandling commands and may be tailored as appropriate to meet the requirements of Chapter 1.

COMMAND

ACTION

PUT OVER/PASS (line number)	Pass the specified line to the pier and provide enough slack to allow line handlers to place the line over the bitt, cleat or bollard.
HOLD (line number)	Do not let any more line out even though the risk of parting may exist.
CHECK (line number)	Hold heavy tension on the specified line but render it as necessary to prevent parting the line.
SURGE (line number)	Hold moderate tension on a line but render it enough to permit movement of the ship.
EASE (line number)	Let a line out until it is under less tension, but not slacked.
SLACK (line number)	Take all tension off a line.
TAKE THE SLACK OUT OF (line number)	Take all the slack out of a line, but do not take a strain.
SHIFT (line number)	Move a line to the specified location.
HEAVE AROUND ON (line number)	Take a strain on a line.
TAKE (line number) TO POWER	Take the specified line to the capstan or gypsy head.
SINGLE UP (line number)	Take in all but one bight so there remains a single part to the line. May also be used to single up all normal mooring lines.
DOUBLE UP (line number)	Pass an additional bight on the specified line so there are three parts to the line. This may also be used to double up all normal mooring lines. Cutters without sufficient mooring line for three parts should just pass the bitter end of the single up to the pier.

COMMAND

ACTION

AVAST or AVAST
HEAVING

Stop taking a strain on a line with capstan.

TAKE IN (line
number)

Allow the pier line handler enough slack to take the line off the fitting and bring the line aboard. Used when secured with your own line.

CAST OFF (line
number)

When you are secured with another ship's lines, it means to cast off the ends of their lines.

Cutter Navigation Teams.

A. Bridge Navigation Team Organization. Bridge Navigation Team members shall complete applicable sections of reference (f) and/or cutter specific Job Qualification Requirements (JQR) for their assigned billets in accordance with reference (b). Navigation Team positions shall be assigned as appropriate for the method of navigation in use. The following are standard navigation team positions and duties:

1. Navigation Evaluator. If not the Navigator, this person is responsible to the Navigator and shall:
 - a. Coordinate the actions of all bridge navigation team members.
 - b. Use all available information to ensure the safe passage of the vessel including electronic fixes plotted on a paper chart, or displayed on an electronic navigation system.
 - c. Evaluate fix accuracy from the Bridge and Combat Information/Support Center (CIC/CSC) (if equipped).
 - d. Evaluate ship's projected movements.
 - e. Make reports to the Conning Officer as specified by the Command Navigation Standards.
2. Navigation Plotter. The Navigation Plotter should not be the same individual as the Navigation Evaluator unless cutter personnel strength precludes this. The Navigation Plotter shall maintain the navigation plot as follows:
 - a. Paper chart navigation:
 - (1) Plot and label each fix on the chart in use.
 - (2) Extend the DR at least two fix intervals.
 - (3) Compute set and drift since last fix.
 - (4) Identify nearest hazard to navigation.
 - (5) Determine time and distance to the next course change.
 - (6) Revise turn bearings.
 - (7) Complete other tasks as directed by the navigator/navigation evaluator.
 - b. Electronic navigation:
 - (1) Plot various types of fixes as applicable, based on the installed electronic navigation system.
 - (2) Complete other tasks as directed by the navigator/navigation evaluator.

3. Bearing Book Recorder. When the cutter is navigating with paper charts, the recorder shall:
 - a. Maintain the Standard Bearing Book (OPNAV Form 3530/2 or equivalent) in accordance with this Manual.
 - b. Maintain communications with the bearing takers.
 - c. Mark fixes at intervals specified by the navigation evaluator.
 - d. Pass pertinent information to the Navigation Plotter/Navigation Evaluator.
 4. Bearing Takers.
 - a. Obtain accurate bearings to navigation aids designated by the Navigation Plotter/Navigation Evaluator.
 - b. Advise the Navigation Plotter regarding the navigation aids available for use, including when navigation aids are acquired visually or lost from sight.
 5. Bridge Radar Observer.
 - a. Provide all radar navigation data as directed by the navigation plotter/navigation evaluator.
 - b. Perform the duties of shipping officer/radar operator on cutters without a CIC/CSC.
 6. Leadsman. Pass soundings to the bridge navigation team for comparison with the fathometer and charted depth.
- B. CIC/CSC Navigation Team Organization. CIC/CSC Navigation Team members shall complete applicable sections of reference (f) and/or cutter specific JQR for their assigned billets in accordance with the reference (b). On cutters without a CIC/CSC, some sections of this PQS may be applicable for the Bridge Navigation Team (e.g., shipping officer, shipping radar operator). The following are standard navigation team positions:
1. Piloting Officer. Supervise the Navigation Radar Operator, Navigation Plotter and Navigation Recorder. The Piloting Officer shall:
 - a. Evaluate fix accuracy.
 - b. Make recommendations to the navigation evaluator based on CIC/CSC's navigation plot.
 - c. Keep the Shipping Officer advised of course/speed changes.
 2. Shipping Officer. Evaluates the surface picture. The Shipping Officer shall:
 - a. Designate contacts to be watched or tracked in accordance with ship's directives.
 - b. Verify that the recommended course is clear of all surface contacts.

3. Shipping Radar Operator. Provides all radar data as directed by the Shipping Officer.
4. Navigation Radar Operator.
 - a. Provide all navigation radar data as directed by the Piloting Officer.
 - b. Maintain communications with, and keep the Navigation Plotter informed of designated points available for use.
5. Navigation Plotter. Maintains CIC/CSC's navigation plot.
 - a. Paper chart navigation:
 - (1) Plots and labels each fix on the chart in use.
 - (2) Extends the DR at least two fix intervals.
 - (3) Computes set and drift since last fix.
 - (4) Identifies nearest hazard to navigation.
 - (5) Determines time and distance to the next course change.
 - (6) Revises turn bearings.
 - (7) Completes other tasks as directed by the Piloting Officer.
 - b. Electronic navigation:
 - (1) Plots various types of fixes as applicable, based on the installed electronic navigation system.
 - (2) Completes other tasks as directed by the Piloting Officer.
6. Navigation Recorder.
 - (1) Logs all Piloting Officer recommendations as well as the standard fix report.
 - (2) Assumes responsibility from the Bearing Book Recorder for designating times of fixes when CIC/CSC has been designated as the primary navigation plot.

Helm Commands

This enclosure provides a list of commonly used helm commands and may be tailored as appropriate to meet the requirements of Chapter 1. Standard phraseology governing orders to the helmsman is required to ensure orders are understood and promptly executed. The helmsman shall repeat each command word-for-word and shall report when the ordered action is complete. The conning officer shall acknowledge the helmsman's responses with "VERY WELL".

COMMAND

ACTION

RIGHT (LEFT)
STANDARD (FULL)
RUDDER

Apply the ordered rudder. Standard rudder is the amount required to turn the ship on its standard tactical diameter. The rudder angle varies from ship to ship. Full rudder is normally the amount required for reduced tactical diameter.

RIGHT (LEFT) ##
DEGREES RUDDER

Apply the ordered rudder. This order may be followed by a new course for the helmsman to steer, such as "STEADY ON COURSE 256" or another rudder command. If no course is specified the helmsman shall call out the heading at 10 degree increments, such as "PASSING 150, PASSING 160", until a course is ordered by the conning officer.

INCREASE YOUR
RUDDER TO RIGHT
(LEFT) ## DEGREES

Increase the rudder angle the amount specified to cause the ship to turn more rapidly. This order may be followed by a new course for the helmsman to steer or another rudder command. If no course is specified the helmsman shall call out the heading at 10 degree increments until a course is ordered by the conning officer.

EASE YOUR
RUDDER/EASE YOUR
RUDDER TO RIGHT
(LEFT) ## DEGREES

Decrease the rudder angle by half the amount currently applied or by the amount ordered. This order may be followed by a new course for the helmsman to steer or another rudder command. If no course is specified the helmsman shall call out the heading at 10 degree increments until a course is ordered by the conning officer.

RUDDER AMIDSHIPS

Place the rudder at zero degrees.

MEET HER

Use the rudder as necessary to check the swing of the ship without steadying on any specific course.

STEADY, STEADY AS
SHE GOES, STEADY ON
COURSE ###

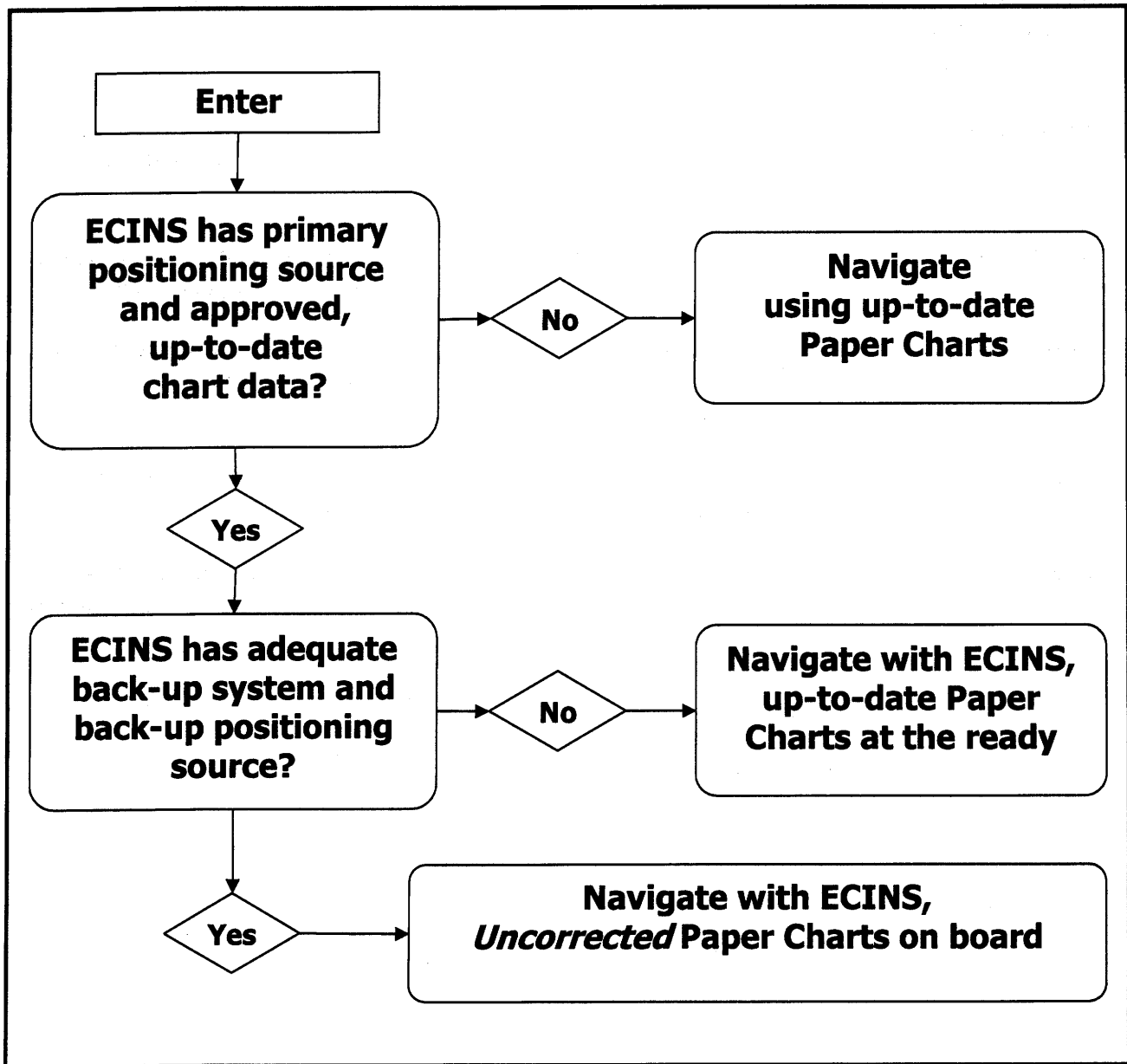
Steer the course on which the ship is currently headed or the ordered course. If the ship is turning and the command STEADY or STEADY AS SHE GOES is given, the helmsman notes the heading and brings the ship back to the heading. The helmsman should then reply "STEADY; COURSE ###".

COMMAND

ACTION

SHIFT YOUR RUDDER	Move the rudder to the same angle in the opposite direction from where it is currently ordered. This order may be given only when a specific rudder angle is in effect.
NOTHING TO THE RIGHT (LEFT) OF COURSE ###	Steer nothing to the right (left) of the course specified.
HOW'S YOUR RUDDER	This is a query from the conning officer to ascertain the current rudder placement. The helmsman replies, "MY RUDDER IS RIGHT(LEFT) ## DEGREES".
MARK YOUR HEAD	Respond "MARK ###". A command to the helmsman to state the heading of the ship at the moment the command was given.
COMMAND	The helmsman's response to the conning officer if he/she did not hear a command, misunderstood a command or believes a command is improper.
STEER ON	The helmsman steers on a range or object identified by the conning officer.
MIND YOUR HELM	A command issued by the Conning Officer, CO, Officer of the Deck (if separate), or the navigator to the helmsman to pay closer attention to his/her steering.

ECINS AND PAPER CHART USE FLOWCHART



Guidance For Boat Forces Units Command Navigation Standards

A. Unit preparations for navigation should:

1. Discuss Coxswain's personal navigation kit (as supplement to the boat outfit).
2. Discuss creation of a master chart (known by various names, i.e. compass card) of the local area by each Coxswain.
3. Discuss Operations Petty Officer responsibility to maintain a master corrected paper chart for the unit and the need to provide a like copy to the Group Operations Center.
4. Discuss unit standardization of GPS waypoints that will be used and maintained on the unit boats.
5. List unit AOR key waypoints. Name or Description (LAT - LONG)

B. Unit qualification and certification should:

1. Discuss key operating areas frequented during normal unit operations. Relate them to the area familiarization requirements of the U.S. Coast Guard Boat Operations and Training (BOAT) Manual, Volume I, COMDTINST M16114.32 (series). CO/OIC may specify increased trips in certain areas to reinforce knowledge necessary to safe navigation.
2. Discuss the local knowledge level relationships between all boat crew and communications watchstanders. Discuss the unit boat crew examining board and unit training program role in reinforcing thorough knowledge of these "key areas" as an important element in reducing risk (basis for Operational Risk Management (ORM), and principles of Team Coordination Training (TCT)).

C. Underway navigation expectations:

1. Prepare before launching if possible. Discuss expectations for pre-sortie navigation planning, plotting, and electronics input. This preplanning will reduce the underway work load, make immediate reference information available, establish waypoints that may be required for the sortie, and allow an opportunity to conduct ORM.
2. Discuss expectations for navigating in the key operating areas within the unit AOR. This would involve use of pre-established track lines or operations within well-marked channels as the normal means of determining position verified by visual observations, GPS and/or radar. This encompasses the use of all-available information and tools. The Coxswain must remain constantly cognizant of the boat's position and keep it in safe water and out of danger.
3. Discuss expectations for navigating outside the above listed key areas. This could involve requirements for an active plot maintained on a chart or with the electronic chart

plotter. This may be as simple as using Estimated Positions (EP's) as validation of the pre-planned DR tracks or as difficult as paper plotting of positions depending on circumstances. The Coxswain must execute the proper level of team coordination to ensure safety and mission success.

4. Discuss navigation expectations in the surf environment. Surf operations are inherently dangerous so prudent use of ranges, depth sounder, sound seamanship, and teamwork is required. The heavy weather Coxswain/surfman must use the electronic tools and visual cues available to determine the boat's current position with verifiable accuracy. They must also accurately recognize the effects of leeway, swell, and current on relative boat movement making proper compensation to allow for a safe transit. This must often be accomplished without additional paper plotting.
5. Discuss boat to shore communications as it might relate to navigation. The navigation demands on the boat crew may be tempered through prudent teamwork with shoreside assets (tower, beach party, vehicle).
6. Discuss operations at night or during periods of restricted visibility.
7. Whenever the position of the boat is in question or the information available is conflicting, discuss the immediate prudent measures to resolve. Normally, this will involve a reduction in speed, station keeping or anchoring long enough to get an accurate plotted fix.

D. Caution or danger areas:

1. Describe areas that pose significant dangers to a boat. A command may direct Coxswains to avoid transit in these areas if not necessary to the sortie and always use extreme caution in piloting when operations require work nearby.
2. Describe areas where unit boats must adhere to no wake zones or speed limits during operations. It is typical that unit boats will observe the no wake requirement as well as take extra caution to lower speed and wake near marina entrances and in areas with high-density traffic. A command may remind Coxswains to conduct normal operations or transits at cruising speed.
3. Discuss operating in areas of hazards or increased risks (wash rocks, crab pots, low visibility etc.).
4. Describe areas where known communications gaps exist in the area of responsibility. Command may require alternatives to operations and position reports when missions take boats into those areas to ensure safety.

Required Forms.

Center (ELC) Baltimore, found in USCG Adobe Forms Library on WSIII or downloaded from the CGWEB at <http://cgweb.uscg.mil/g-c/g-ccs/g-cit/g-cim/forms2/welcome.htm>.

OPNAV Forms mentioned in Chapter 9 can be ordered online at <http://forms.daps.dla.mil> or by MILSTRIP message.

FORM	FORM TITLE	STOCK NUMBER	UNIT OF ISSUE	SOURCE OF SUPPLY
CG-4380A	LOG REMARKS SHEET	7530-00-F01-7410	HD (100 sheets)	ZMB
CG-4380B	LOG-WEATHER OBSERVATION AND OPERATIONAL SUMMARY SHEET	7530-00-F01-7420	HD (100 sheets)	ZMB
CG-4380C	LOG-NAVIGATION DATA SHEET	7530-00-F01-7430	HD (100 sheets)	ZMB
OPNAV 3100/3	SHIP POSITION LOG	0107-LF-031-0015	BK	DLA
OPNAV 3530/2	STANDARD BEARING BOOK	0107-LF-724-5110	BK	DLA
OPNAV 3530/1	NAVY NAVIGATION WORKBOOK	0107-LF-981-8700	BK	DLA

Sample Getting Underway Checklist

This enclosure provides a sample checklist containing common actions that must be taken prior to getting underway. This checklist may be tailored as appropriate to meet the requirements of Chapter 9.

<u>Time prior to</u>	<u>Event</u>
48 Hours	<p>Establish getting underway schedule covering: propulsion plant light off, shift from shore to cutter power, disposal of cutter vehicles, light off and testing of electronic suite, U.S. and Guard Mail.</p> <p>Release MOVREP.</p>
24 Hours	<p>Conduct navigation brief</p> <p>Verify arrangements for tugs/pilots/line handlers.</p> <p>Verify schedule for lighting-off power plant.</p> <p>Energize gyrocompasses.</p> <p>Check navigation lights for proper operation (Preferably at night).</p> <p>Ascertain schedule of other vessel movements in harbor on underway day.</p>
4 Hours	<p>Energize all radars except those prohibited by local electromagnetic emissions restrictions.</p> <p>Energize and configure ECINS/ECS, if so equipped.</p> <p>Validate DGPS/GPS datum.</p> <p>Reconfirm tugs/pilots/line handlers.</p> <p>Verify arrangements for terminating shore services.</p>
2 Hours	<p>Ascertain from the executive officer/executive petty officer any anticipated deviations from the Plan of the Day.</p> <p>Promulgate underway time to all hands.</p> <p>Energize and initialize all electronic navigation equipment. (Coordinate with shift from shore to cutter power.)</p> <p>Energize and calibrate all radar repeaters. (Post errors at each repeater and for navigation plotters.)</p> <p>Determine and post gyro, steering, and navigation repeater errors and enter into electronic navigation system, as applicable. Check/energize all other electronic equipment (e.g. fathometer, etc.).</p> <p>Conduct radio checks on all required circuits. (Include bridge-to-bridge radiotelephone)</p>
1 Hour	<p>Set condition Yoke.</p>

	Tune and optimize radars.
	Post tide/current/aids to navigation information on the bridge and CIC/CSC.
45 Minutes	Fix ship's position using all available positioning sources.
	Record draft of cutter fore and aft in cutter's deck log.
30 Minutes	Station the Special Sea Detail and Anchor Detail.
	In reduced visibility:
	1. Station the low visibility detail.
	2. Set material condition Zebra on main deck and below.
	Embark pilot. Display CODE HOTEL.
	Check steering in all available modes.
	Test sound-powered phone circuits in use.
	Receive department reports for readiness to get underway.
	Test anchor windlass.
	Prepare anchor(s) for letting go.
	OOD shift watch to the bridge.
15 Minutes	Obtain CO/OICs permission to shift to pilot house control (when equipped) and test main engine(s).
	Direct engineering control accordingly after ensuring that the screw(s) are clear.
	Test cutter's whistle/general alarms.
	Single up lines.
	Make SECURITE calls.
	Take in the brow and break all shore connections.
	Conduct time check.
	Report when "ready for getting underway" to the executive officer/executive petty officer.
10 Minutes	Warn engineering control to standby to answer all bells or of impending pilothouse control maneuvers.
Zero Time	Underway.
	Shift colors/close up international call sign (if appropriate).
	Make SECURITE calls.
	Report underway to VTS if appropriate.
After U/W	Return checklist to navigator for filing.

Sample Entering Port/Approaching Restricted Waters Checklist

This enclosure provides a sample checklist containing common actions that must be taken prior to Entering Port/Approaching Restricted Waters. This checklist may be tailored as appropriate to meet the requirements of Chapter 9.

<u>Time prior to</u>	<u>Event</u>
24 Hours	Conduct navigation brief.
3 Hours	Determine and post gyro, steering, and navigation repeater errors and enter into electronic navigation system, as applicable.
1 Hour	Pass the word, "Make all preparations for entering port. Cutter will anchor (berth _____ side to) at about _____. All hands shift into the Uniform of the Day." Lay out mooring lines if required. Set up and check all harbor and tug radio frequencies. Check into VTS when appropriate. Ascertain schedule of other vessel movements in harbor.
45 Minutes	Test cutter's whistle/general alarms. Station the Navigation Detail. Prior to approaching restricted waters, check steering in all available modes. Test backing bells. Hoist international call sign when entering inland waters (if applicable).
30 Minutes	Station the Special Sea Detail and Anchor Detail. Make anchor(s) ready for use. Inform the Anchor Detail of depth of water at anchorage, type of bottom, ready anchor, and scope of chain to be used. Inform first lieutenant as to range of tide and time of high water. Receive readiness reports for entering port. Make SECURITE calls. Request permission to enter port from the proper authority.
15 Minutes	If mooring to a buoy, lower boat with buoy detail as directed. Station line handlers. Standby to receive tugs and pilots.

Upon Mooring Secure main engines on _____ hour standby.
 Secure gyros and navigational radars as directed.
 Check out of VTS as appropriate.
 If anchored, obtain navigation bearings and ranges, and determine
 swing and drag circles.
 Record draft of cutter fore and aft.
 Shift watch to quarterdeck.
 Return checklist to navigator for filing.